

WHAT IS CLAIMED IS:

1. A liquid switch, comprising:
a channel for flowing a first liquid therethrough;
a damming portion provided in said channel for damming said first liquid; and
5 a trigger channel communicated into said channel at a position of said damming portion or of downstream thereof for guiding a second liquid to said damming portion.
2. The liquid switch according to claim 1, wherein said damming portion includes a member for holding said first liquid.
3. The liquid switch according to claim 2, wherein a channel surface area per channel unit volume in said damming portion is larger than a channel surface area per channel unit volume in other portions of the channel.
4. The liquid switch according to claim 2, wherein said member holding said first liquid is a plurality of particles.
5. The liquid switch according to claim 2, wherein said member holding said first liquid is a porous member.
6. The liquid switch according to claim 2, wherein said member holding said first liquid includes a plurality of protruding portions that are separately arranged.

7. The liquid switch according to claim 2, wherein said damming portion includes a region exhibiting a lyophobicity for said first liquid.

8. The liquid switch according to claim 7, further comprising a region exhibiting a lyophobicity for said first liquid at a downstream of an intersecting point in said channel where said channel intersects with and said trigger channel.

9. The liquid switch according to any one of claims 1 to 8, wherein said liquid switch is configured to include a valve structure in said trigger channel, and wherein said valve structure is actuated once a specified quantity of the second liquid is introduced, to closedown
5 said trigger channel.

10. A liquid switch, comprising:
a channel for flowing a liquid therethrough; and
a damming portion provided in said channel for damming said liquid;
5 wherein said damming portion includes a member holding said liquid.

11. The liquid switch according to claim 10, wherein a channel surface area per channel unit volume in said damming portion is larger than a channel surface area per channel unit volume in other portions of the channel.

12. The liquid switch according to claim 10 or 11, wherein said member holding said liquid is a plurality of particles.

13. The liquid switch according to claim 10 or 11, wherein said member holding said liquid is a porous member.

14. The liquid switch according to claim 10 or 11, wherein said member holding said liquid includes a plurality of protruding portions that are separately arranged.

15. A liquid switch, comprising:

a channel for flowing a liquid therethrough; and

a damming portion provided in said channel for damming said liquid;

5 wherein said damming portion includes a surface exhibiting a lyophobicity for said liquid.

16. The liquid switch according to claim 15, further comprising a moving member movably disposed between said damming portion and a place except said damming portion in said channel,

wherein said moving member has a surface exhibiting a lyophilicity

5 for said liquid, and that a position of said moving member can be adjusted from outside of said channel.

17. The liquid switch according to claim 16, further comprising a positioning unit that adjusts the position of said moving member from outside thereof,

wherein one of said moving member and said positioning units, is a
5 magnet and the other is a magnetic material.

18. A liquid switch, comprising:
a channel for flowing a first liquid therethrough;
a secondary channel communicating with said channel;
a chamber communicating with said secondary channel; and
5 a trigger channel communicating with said chamber and for
introducing a second liquid into said chamber,
wherein a lyophobic material exhibiting a lyophobicity for said first
liquid is stored in an interior of said chamber, and
wherein said liquid switch is configured that said lyophobic material
10 is introduced from said chamber into said channel once the second
liquid is introduced from said trigger channel into said chamber.

19. The liquid switch according to claim 18, wherein said chamber
comprises:
a first compartment communicating with said secondary channel;
a second compartment for storing said lyophobic material; and
5 a separating portion disposed between said first compartment
and said second compartment for separating the compartments,
wherein said trigger channel communicates with said separating
portion, and said liquid switch is configured that said lyophobic
material moves from said first compartment to said second compartment
10 once the second liquid is introduced from said trigger channel.

20. A microchip, comprising:

a substrate;

a sample channel formed on said substrate for passing a sample therethrough; and

5 sample separating portion provided in said sample channel, wherein the liquid switch according to any of claims 1 to 19 is disposed in said sample channel, and a feeding of said sample from said sample channel to said sample separating portion is controlled with said liquid switch.

21. A microchip, comprising:

a substrate;

a liquid channel formed on said substrate for flowing a liquid therethrough; and

5 a reaction portion provided in said liquid channels, wherein the liquid switch according to any of claims 1 to 19 is disposed in said liquid channel, and a feeding of said liquid from said liquid channel to said reaction portion is controlled with said liquid switch.

22. The microchip according to claim 21, further comprising: a reservoir communicating with said reaction portion, for being introduced with an agent,

wherein said liquid switch is disposed in a liquid channel extending
5 from said reservoir to said reaction portion, and an introduction of said agent from said reservoir into said reaction portion is controlled with said liquid switch.

23. The microchip according to claim 22, wherein said agent is an enzymatic digestion solution.

24. The microchip according to claim 23, wherein said enzymatic digestion solution is a tryptic digestion solution.

25. A microchip, comprising:

a substrate;

a principal channel formed on said substrate for flowing a liquid therethrough;

5 a clock channel for controlling a timing of said liquid passing a predetermined point in said principal channel; and

a control channel communicating with said principal channel and said clock channel,

wherein the liquid switch according to any of claims 1 to 19 is
10 disposed in said control channel, and a transfer of said liquid in said principal channel is controlled with said liquid switch.

26. A mass spectrometry system, comprising:

a separating unit that separates biological sample according to molecular size or a property thereof;

a pre-processing unit that conducts a pre-processing including
5 an enzymatic digestion processing for the sample separated by said separating unit;

a drying unit that dries the preprocessed sample; and

a mass spectrometry unit that conducts mass spectrometry of the dried sample,

10 wherein said separating unit includes the microchip according to claim 20.

27. A mass spectrometry system, comprising:

a separating unit that separates biological sample according to molecular size or a property thereof;

a pre-processing unit that conducts a pre-processing including
5 an enzymatic digestion processing for the sample separated by said separating unit;

a drying unit that dries the preprocessed sample; and

a mass spectrometry unit that conducts mass spectrometry of the dried sample,

10 wherein said pre-processing unit includes the microchip according to any one of claims 21 to 24.

28. A mass spectrometry system, comprising:

a separating unit that separates biological sample according to molecular size or a property thereof;

a pre-processing unit that conducts a pre-processing including
5 an enzymatic digestion processing for the sample separated by said separating unit;

a drying unit that dries the preprocessed sample; and

a mass spectrometry unit that conducts mass spectrometry of the dried sample,

10 wherein said separating unit, said pre-processing unit or said drying unit includes the microchip according to claim 25.